

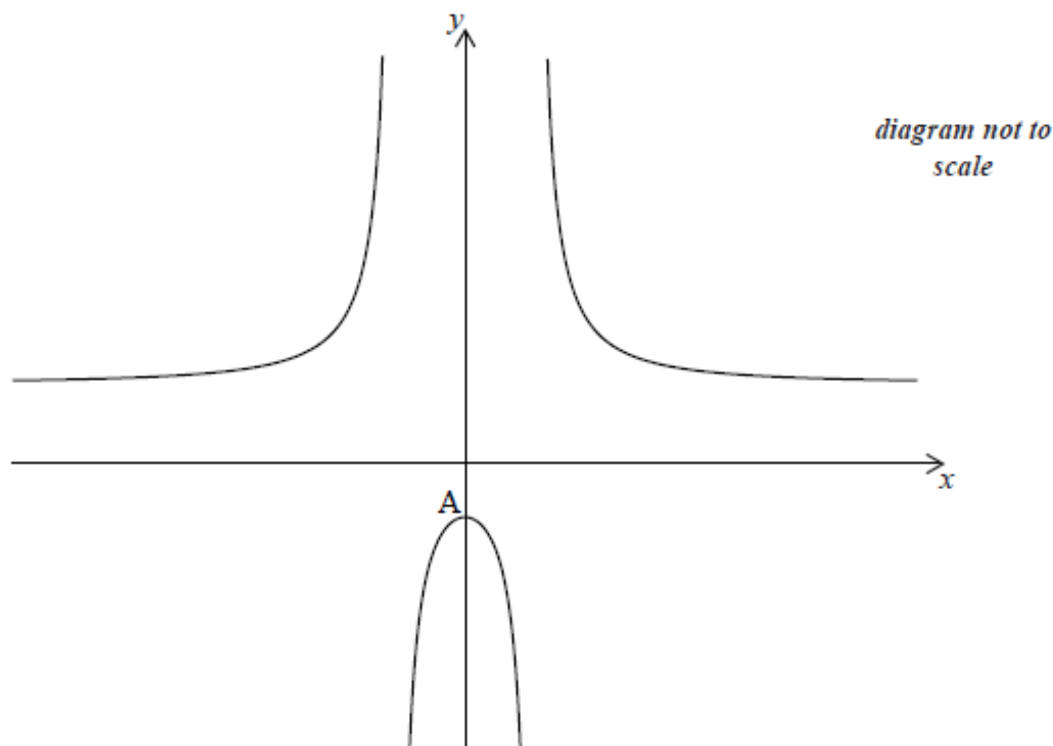
NO CALCULATOR

Worksheet 4

1.

[Maximum mark: 16]

Let $f(x) = 3 + \frac{20}{x^2 - 4}$, for $x \neq \pm 2$. The graph of f is given below.



The y -intercept is at the point A.

(a) (i) Find the coordinates of A.

(ii) Show that $f'(x) = 0$ at A.

[7 marks]

(b) The second derivative $f''(x) = \frac{40(3x^2 + 4)}{(x^2 - 4)^3}$. Use this to

(i) justify that the graph of f has a local maximum at A;

(ii) explain why the graph of f does not have a point of inflexion.

[6 marks]

(c) Describe the behaviour of the graph of f for large $|x|$.

[1 mark]

(d) Write down the range of f .

[2 marks]

NO CALCULATOR

Worksheet 4

2.

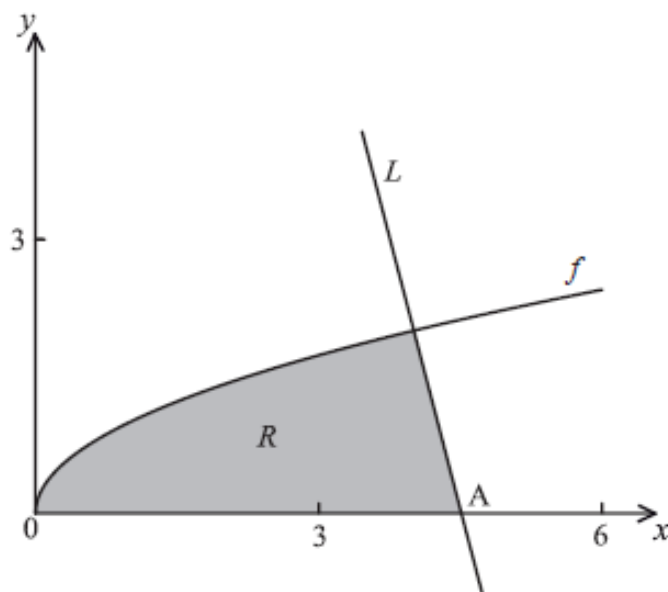
[Maximum mark: 17]

Let $f(x) = \sqrt{x}$. Line L is the normal to the graph of f at the point $(4, 2)$.

(a) Show that the equation of L is $y = -4x + 18$. *[4 marks]*

(b) Point A is the x -intercept of L . Find the x -coordinate of A . *[2 marks]*

In the diagram below, the shaded region R is bounded by the x -axis, the graph of f and the line L .



(c) Find an expression for the area of R . *[3 marks]*

(d) The region R is rotated 360° about the x -axis. Find the volume of the solid formed, giving your answer in terms of π . *[8 marks]*

NO CALCULATOR

Worksheet 4

3.

[Maximum mark: 6]

Consider $f(x) = x^2 + \frac{p}{x}$, $x \neq 0$, where p is a constant.

(a) Find $f'(x)$. *[2 marks]*

(b) There is a minimum value of $f(x)$ when $x = -2$. Find the value of p . *[4 marks]*